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(54) **Hypodermic syringes.**

(57) A hypodermic, preferably a disposable hypodermic syringe has provision for rendering the needle (12) incapable of harming anyone when the syringe has been used or is discarded. The syringe operates with an initially retracted needle (12) which is driven to a protruding position when the syringe is used. After use, the needle (12) is retracted from the protruding position and bent into a safe position by rotation of a disc (6) about a post (18).

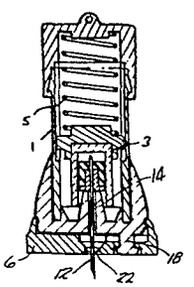

FIG-3

EP 0 034 231 A1

HYPODERMIC SYRINGES

This invention relates to hypodermic syringes, and more particularly, but not exclusively, to disposable hypodermic syringes.

There is a need in the medical field for a disposable hypodermic syringe which can be factory pre-loaded with an accurately measured amount of medicament and then safely store the medicament for an extended period of time, say one year or more, before use. This type of syringe could be used by both trained and untrained persons, and if made to operate automatically, could be used by laymen to self-administer injections, or to administer injections to others.

One problem to be solved with such syringes and which also arises with non-disposable syringes, relates to the needle which is left projecting from the syringe after it has been used and which may cause injury to someone handling the syringe. One solution to this problem which has been proposed in the case of disposable syringes involves the use of a return spring which automatically retracts the needle after a main spring has driven the needle out of the syringe housing. This solution, however, requires a delicate balancing of spring forces so as to ensure that the injection is properly administered. This balancing is not readily achieved at least in a mass-produced, disposable syringe designed for only a single use.

Another proposed solution to this problem involves retraction of the needle, which at least partially resets, or recocks the syringe, but this is not desirable with a disposable unit because it enables the syringe to be reused possibly for illicit purposes.

According to the present invention there is provided a hypodermic syringe comprising:

a housing for containing an ampoule of medication and a hypodermic needle, said needle having an injecting position wherein said needle protrudes from said housing; and

retracting means movably mounted on said housing, said retracting means being movable to engage and bend said needle to pull said needle from its protruding injecting position to a safe position wherein said needle is covered over by a portion of said syringe.

Thus embodiments of the invention operate to retract the needle from the protruding position while also deforming the needle by bending it

so that the needle cannot be reused or even separated from the syringe easily. Thus, the needle presents no possible injury problem, nor can it be in any way used for possibly illicit purposes after the syringe has been used for its intended purpose. Moreover, the retracting means can be inexpensively made, and need not appreciably increase the size or weight of the syringe.

The invention will now be described by way of example with reference to the accompanying drawing, in which:

Figure 1 is a side elevational view of an embodiment of disposable hypodermic syringe according to the invention;

Figure 2 is an axial sectional view of the syringe of Figure 1 showing details of a needle retracting portion thereof, the syringe being shown in cocked, ready-to-use condition;

Figure 3 is an axial sectional view similar to Figure 2, but showing the syringe as it appears after an injection has been administered, and the needle has been driven to a position wherein it protrudes from the syringe housing;

Figure 4 is an axial sectional view similar to Figure 3, but showing the initial phase of actuation of the needle retracting portion of the syringe; and

Figure 5 is an axial sectional view similar to Figure 4 showing the final stage of operation of the needle retracting portion of the syringe, wherein the syringe is ready to discard.

Referring to Figures 1 and 2, there is shown an automatic, disposable hypodermic syringe 2 comprising a housing 1 for containing an ampoule 3 of medicament 4, a hypodermic needle 12, and a spring 5 for driving the needle 12 to an operative position and discharging the medicament 4 therethrough.

The parts of the syringe 2 of particular relevance to the invention are those associated with the needle 12, and these will be described in detail. An end surface 34 of the syringe 2 can be termed the bottom surface, that is, the surface which is pressed against the skin of the user, when administering the injection. The bottom surface 34 is formed on a disc 6 which is movably mounted on the housing 1 of the syringe 2. A pair of tabs 8 engage recesses 10 (Figure 2) in the housing 1 to assist in properly indexing and retaining the disc 6 in the required orientation with respect to the housing 1.

As shown in Figure 2, the syringe 2 has the retracted needle 12

aligned with a bore 14 through which the needle 12 is driven to administer the injection. A strip of tape 16 closes the bore 14 to preserve the sterility of the interior parts of the syringe 2, the tape 16 being pierced when the needle 12 is driven to the protruding position to administer the injection. The lower portion of the housing 1 of the syringe 2 is formed with a projecting post 18 which extends through a hole 20 in the disc 6. Thus the disc 6 is able to pivot about the post 18 with respect to the housing 1; however, the disc 6 is indexed and held in the position shown in Figures 1 and 2 by the tabs 10. The disc 6 also includes a through passage 22 which is coaxial with the needle 12 and the bore 14 when the disc 6 is indexed to the position shown in Figure 2. The passage 22 is provided with chamfered ends 24 and 26 to help prevent snagging of the needle 12 when it is retracted after use. The upper surface of the disc 6 is formed with a closed circular slot 28 which extends radially but eccentrically from the passage 22, stopping short of the side wall 30 of the disc 6. It will be noted that the post 18 extends through the slot 28 which is wider than the post 18 so as not to inhibit rotation of the disc 6 with respect to the housing 1.

It will be appreciated that, with the parts in their respective positions shown in Figure 2, the syringe 2 is in a cocked and ready-to-use condition. On administering an injection, the parts of the syringe 2 move to the respective positions shown in Figure 3, wherein the needle 12 protrudes from the syringe 2 a predetermined distance through the bore 14 and the passage 22. After the injection has been administered, the needle 12 is retracted by turning the disc 6 through a 360^{0} revolution about the post 18, from the position shown in Figure 3 via the position shown in Figure 4 to the position shown in Figure 5. It will, of course, be noted that the axis of rotation, that is the axis of the post 18 and the hole 20, of the disc 6 is radially offset from the axis of the needle 12 and the passage 22. Thus when the disc 6 is rotated about the post 18, the passage 22 is swept along an arcuate path and the wall of the passage 22 bears against the protruding needle 12 and bends it. Since the needle 12 cannot be pulled through the bore 14 due to an enlarged ferrule 15 secured to the needle 12, movement of the passage 22 through this arcuate path will cause the needle 12 to be drawn back through the passage 22 and preferably into the slot 28, as shown in Figure 4. It will be noted that the substantially circular shape of the slot 28 ensures that, during rotation of the disc 6, the outer edge of the slot 28

will remain below the bore 14 so that the needle 12 can be smoothly fed into the slot 28 through the passage 22. Engagement of the needle 12 by the passage 22 and the side wall of the slot 28 will bend the needle 12 and render it un-reusable. If the needle 12 is long enough, rotation of the disc 6 back to the position shown in Figure 5 will preferably wrap the needle 12 to some extent around the post 18. It will be noted that only a single tab 10 could be used, or the tabs 10, if two are used, can be break-away tabs so as not to interfere with rotation of the disc 6.

It will be readily appreciated that the bent, retracted needle 12 is completely covered, so that it cannot cause harm to anyone. The retractor is part of the syringe 2, so that it cannot be left behind when the syringe 2 is carried about prior to use. The syringe housing part, which includes the post 18 is preferably made of injection moulded plastics material, as is the disc 6. The disc 6 can simply be press-fitted onto the post 18 and the tabs 8 properly aligned when the syringe 2 is assembled.

Although the embodiment described is a disposable hypodermic syringe, it will be understood that the invention can readily be applied to a non-disposable hypodermic syringe. For example, in such a case the construction may be modified so that the disc 6 can be removed at some convenient time after use of the syringe 2 and retraction and deforming of the needle 12 to permit discarding of the used, bent needle 12 and fitting of a new needle, or preferably a complete new unit comprising the combination of a new ampoule 3 of medication 4 and a new needle 12, for which purpose the housing 1 may be formed of parts which can be disassembled. The disc 6 is then refitted and the syringe 2 is ready for re-use.

CLAIMS

1. A hypodermic syringe (2) comprising:
a housing (1) for containing an ampoule (3) of medication (4) and a hypodermic needle (12), said needle (12) having an injecting position wherein said needle (12) protrudes from said housing (1); and
retracting means (6) movably mounted on said housing (1), said retracting means (6) being movable to engage and bend said needle (12) to pull said needle (12) from its protruding injecting position to a safe position wherein said needle (12) is covered over by a portion of said syringe (2).

2. A syringe (2) according to claim 1 and of disposable form intended to be used only once, wherein:
said housing (1) contains a said ampoule (3) and a said needle (12), said needle (12) being disposed in a retracted position completely within the confines of said housing (1);
means (5) is provided in said housing (1) for driving said needle (12) through a needle port (14) in said housing (1) to said injecting position wherein said needle (14) protrudes from said housing (1); and
said retracting member (6) is disposed on said housing (1) in a position wherein said needle port (14) is unblocked for passage therethrough of said needle (12) and said retracting member (6) is movable laterally across said needle port (14) to engage said needle (12) as it protrudes through said needle port (14) and bend said needle (12) and pull said needle (12) to said safe position.

3. A syringe (2) according to claim 2 wherein said retracting member is a disc (6) mounted adjacent to said one end of said housing (1), said disc (6) being movable across said one end of said housing (1) but being secured to said housing (1) so as not to be readily detactable therefrom, said disc (6) being movable from a first position wherein said needle port (14) is unblocked for passage of said needle 12 therethrough to a second position wherein said disc (6) moves laterally across said needle port (14) to engage the protruding needle (12) and bend the latter thereby retracting said needle (12) out of its protruding position to said safe position wherein said needle (12) is completely covered by a portion of said disc (6).

4. A syringe (2) according to claim 3 wherein said disc (6) is provided with a through passage (22) which is coaxial with said needle port (14) when said disc (6) is in said first position, the edge of said passage (22) engaging said protruding needle (12) when said disc (6) is moved towards said second position.

5. A syringe (2) according to claim 4 wherein said disc (6) is mounted on said one end of said housing (1) for rotation about an axis which is radially offset from the axis of said needle port (14).

6. A syringe (2) according to claim 5 wherein said disc (6) is provided with an internal slot (28) into which said through passage (22) opens, said slot (28) providing means for containing the bent needle (12).

7. A syringe (2) according to claim 5 further comprising detent means (6, 10) for releasably retaining said disc (6) in said first position.

8. A syringe (2) according to any one of claims 2 to 7 further comprising a tape (16) secured to said one end of said housing (1) overlying said needle port (14) to maintain sterility in the interior of said housing (1) until said tape (16) is pierced by said needle (12) as said needle (12) is driven to said injecting position.

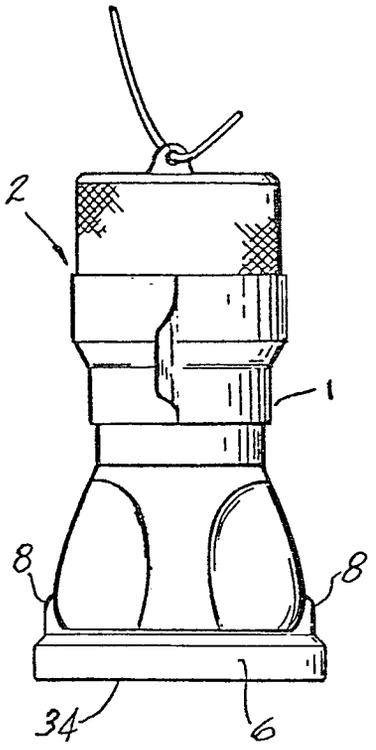

FIG-1

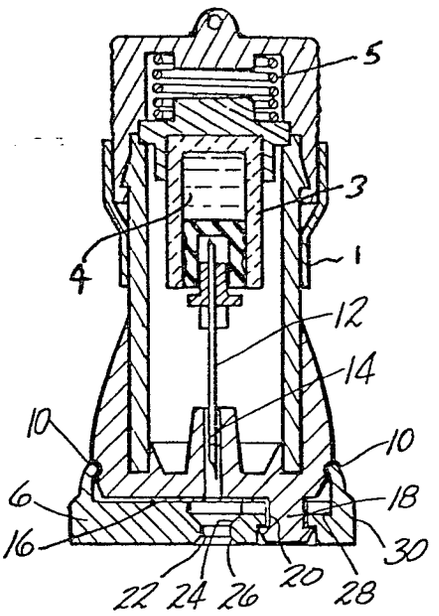

FIG-2

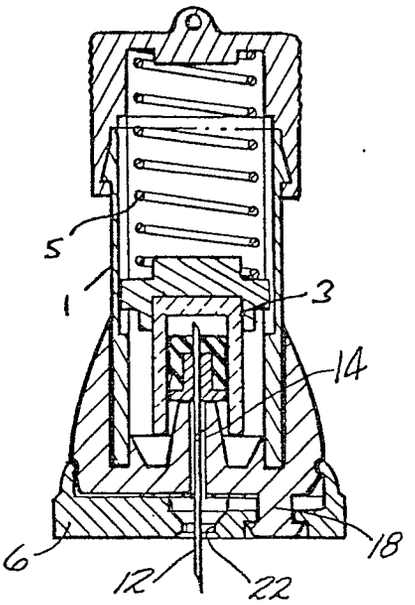

FIG-3

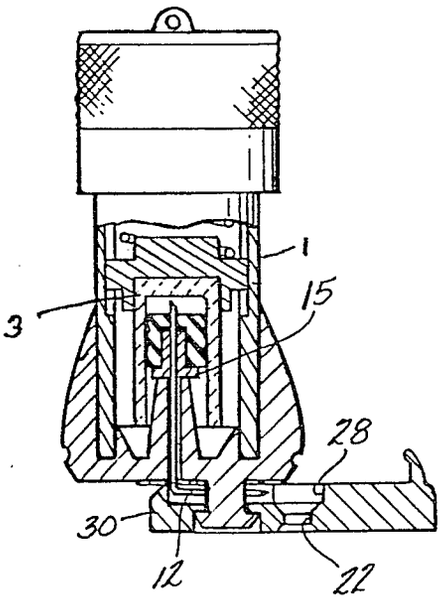

FIG-4

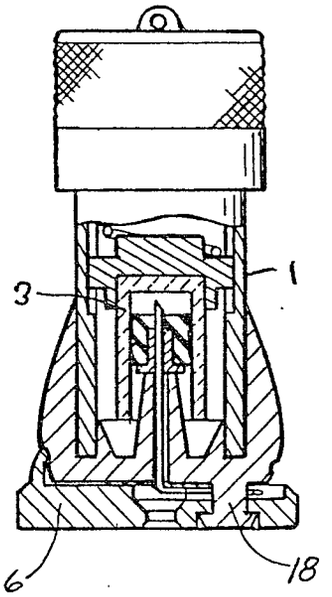

FIG-5

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 80 30 0473.8

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
	US - A - 3 890 971 (LEESON et al.) * columns 3, 4; fig. 2, position 16 * --	1,2,8
	US - A - 3 893 608 (KOENIG) * claims 1, 7; fig. 3, 5, 6 * --	1
T	US - A - 4 188 950 (WARDLAW) date of publication : 19 February 1980 * whole document * --	1-8
A	WO - A1 - 79/00239 (KONSINVENIOR AB et al.) * claim 1; fig. 1 to 3 * --	
A	US - A - 3 320 954 (COWLEY) * fig. 3, 8 * --	
A	US - A - 3 796 359 (DICK) * claim 1 * --	
A	DE - U - 7 425 713 (STOLLENWERK) * page 1; fig. 3 * --	
A	US - A - 3 797 491 (HURSCHMAN) * fig. 2 to 6; position 14 * --	
A	US - A - 3 605 744 (DWYER) * fig. 1, 2 * --	

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CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

A 61 M 5/28
A 61 M 5/32

TECHNICAL FIELDS SEARCHED (Int.Cl.³)

A 61 M 5/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	22-10-1980	DROPMANN

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EUROPEAN SEARCH REPORT

Application number
EP 80 30 0473.8

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	US - A - 3 797 489 (SARNOFF) * fig. 1, 2 * --		
A	FR - A - 2 220 280 (HUDELOT) * fig. A * --		
A	FR - A1 - 2 342 079 (CONSTANTINIDIS) * whole document * ----		TECHNICAL FIELDS SEARCHED (Int. Cl.³)